

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY
SAULT STE MARIE, ONT.

COURSE OUTLINE

COURSE TITLE: MECHANICAL SYSTEMS ANALYSIS
COURSE CODE: MCH316
PROGRAM: MECHANICAL ENGINEERING TECHNOLOGY
SEMESTER: SDCTH
AUTHOR: Dan Grand
DATE: January 1995
PREVIOUSLY DATED: November 1993

APPROVED:

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DEAN *D. Grand*

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TOTAL CREDITS: 3

PREREQUISITES: Must have successfully completed process control (MCH315) and Introduction to Computers {CET100} or equivalent.

I- PHILOSOPHY/GOALS

It is the intent of this course to give the students an appreciation for and hands on lab experience with the use and the function of PLC's within the current industries.

II. STUDENT PERFORMANCE OBJECTIVES(OUTCOMES)

Upon successful completion of this course, the student will be able to demonstrate the following attitudinal/inherent and PLC/technical skills:

- make clean, careful, meticulous notes, assignments and records
- demonstrate punctual, industrious attendance
- demonstrate persistence and ability to resolve/identify problems
- organize and plan technical work independently and in small groups.
- communicate clearly in written form
- consult and extract relevant information from MANUALS
- demonstrate patience, teamwork and co-operation.

III. TOPICS TO BE COVERED

- 1) PLC hardware for Modicon 884 and 984
- 2) Ladder logic
- 3) Modicon 884 software
- 4) Modicon 984 software
- 5) PLC programming
- 6) Data Acquisition for Lab View 3.01
- 7) Project

IV, LEARNING ACTIVITIES/REQUIRED RESOURCES

1) PLC HARDWARE: (ON BOTH THE 884 & 984)

Learning Activities:

- identify the power supply, I/O modules, rack, slot, processor and communications link between PLC and PC.
- ascertain the modules id #, number of input and outputs, type of input or output on sight.
- locate and interpret the modbus, power and status lights on the above units.
- locate I/O connection pins given the Traffic Cop and I?O ladder logic address.

Resources:

- System manuals
- Handouts

2) LADDER LOGIC

Learning Activities:

- state the direction of power flow
- identify rungs, networks
- identify contacts, coils, timers, counters.
- describe the difference between series and parallel elements
- identify AND, and OR combinations
- distinguish and define addresses, registers, register contents, discrete, decimal, binary, octal, hexadecimal, and bits.
- distinguish between logic mode, ladder mode and documentation.
- state the difference between NC and NO contacts and give an example of use.
- write simple PLC programs using contacts, coils, timers and counters.

Resources:

- System manuals
- Handouts
- Overheads

IV, LEARNING ACTIVITIES/REQUIRED RESOURCES (continued)

3 and 4) 884/984 SOFTWARE

Learning Activities:

- state difference between on-line and off-line programming.
- state the addressing rules for 884 I/O, timers, and counters.
- and the following:

OFFLINE PROGRAMMING

- select an existing "active PLC"
- create a new "active PLC" in off-line mode.
- Save an "active PLC" onto floppy diskette/hard drive.

EDITING

- set correct path or active PLC and directories to save/retrieve files onto/from floppy diskettes or hard drive.
- interpret status line at top of screen
- move cursor about on screen and page up or down
- delete or replace an element
- delete or insert a network
- invoke and use the help, del, ins and "f" key menus
- invoke and use the edit menu by "?"
- perform a simple search.

ON-LINE PROGRAMMING

- attach to a PLC.
- start and stop a PLC.
- load an active PLC from floppy diskette/hard drive into the 884.
- monitor the operation of the program resident in the 884.
- modify a program resident in the 884 by on-line programming.
- change from monitor mode to program mode and back again.
- download a program resident in the 884 onto floppy diskette/hard drive.
- set up and save a correct traffic cop.

LOGIC SCREEN

- invoke logic screen
- set up logic screen to monitor discrete and register data
- enable and disable contacts and coils
- force on and off contacts and coils

IV, LEARNING ACTIVITIES/REQUIRED RESOURCES (continued)

- modify register contents
- set up and use logic window in ladder display

Resources:

- Modicon 884 and 984 software packages
- Modicon system manuals
- Overheads and handouts

5) PLC PROGRAMMING

Learning Activities:

- design, write, debug, execute and document PLC programs on the 884 and 984 to accomplish simple tasks.
- develop logical thinking

Resources:

- Modicon 884 and 984 software
- System manuals

6) DATA ACQUISITION FOR LAB VIEW 3.0.1

Learning Activities:

- use software modules to accomplish basic data acquisition of temperature and strain

Resources:

- Lab View software
- Video Tape
- Lab View system manuals

IV. LEARNING ACTIVITIES/REQUIRED RESOURCES Continued)

7) PROJECT

Learning Activities:

- Independent analysis of a complex problem

Resources:

- using existing documentation complete a major project on one of the following Fischer Models:

OHCRANE
PROCESS LINE
ROBOT
984/ANALOGUE I/O

V, METHOD OF EVALUATION

Each test will consist of a theory portion and a laboratory hands on portion.
Attendance is mandatory for successful completion of the course.
Students will be assigned a final grade based on assignments, quizzes and tests.

Assignments	15%
Major Project	20%
Mid Term Test	25%
Final Test	30%
Attendance	10%

will be assigned as follows:

A+	90 -100 %
A	80- 89%
B	70- 79%
C	55- 69%
R	Repeat

VI. REQUIRED STUDENT RESOURCES (Including textbooks and workbooks)

NONE

VII, ADDITIONAL RESOURCES AND MATERIALS

There are numerous system manuals available in B1108 and B2104

VIII, SPECIAL NEEDS

Students with special needs are encouraged to discuss required accommodations in confidence with the instructor.

The instructor reserves the right to modify the course and course outline as deemed necessary to meet the needs of the students.

IX, AGENDA OF ACTIVITIES:

The course will consist of weekly 3 hours blocks.

During the first half of the course the three hour blocks will be comprised of: 1 hour of theory and 2 hours of labs.

During the second half of the course the three hours blocks will be comprised mainly of lab work on the assigned project.

